

# SIRIUS XM

RADIO INC.

1500 Eckington Place, N.E.  
Washington, D.C. 20002  
Tel: 202-380-4000  
Fax: 202-380-4500  
www.sirius.com  
www.xmradio.com

December 11, 2008

Ms. Marlene H. Dortch  
Secretary  
Federal Communications Commission  
445 12th Street, S.W.  
Washington, D.C.

**Re: Ex Parte Submission  
IB Docket No. 95-91  
WT Docket No. 07-293**

Dear Ms. Dortch,

On December 3, 2008, FCC Chairman Kevin Martin announced that the Commission was considering a draft order in the above-captioned proceedings<sup>1</sup> addressing final rules for the deployment of satellite radio terrestrial repeaters and modifying the Commission's existing technical standards for Wireless Communications Services ("WCS").

Sirius XM Radio Inc. ("Sirius XM") has waited since 1997 to conclude IB Docket No. 95-91, under which Sirius XM will finally get rules for licensing and operating the terrestrial repeaters that the Commission has long recognized are needed to complement satellite radio services.<sup>2</sup> However, there is no similar need to proceed with the adoption of modified rules that would allow, for the first time, widespread mobile deployment in the WCS bands in the manner proposed in the draft decision. The WCS proposals – which have been pending only since **2007** and **not 1997** – are being rushed to judgment.

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<sup>1</sup> *Amendment of Part 27 of the Commission's Rules to Govern the Operation of Wireless Communications Services in the 2.3 GHz Band; Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, WT Docket No. 07-293, IB Docket No. 95-91, GEN Docket No. 90-357, RM No. 8610, Notice of Proposed Rulemaking and Second Further Notice of Proposed Rulemaking, 22 FCC Rcd 22123, 22132 (¶ 24) (rel. Dec. 18, 2007).

<sup>2</sup> *See Establishment of Rules and Policies for the Digital Audio Radio Satellite Service in the 2310-2360 MHz Frequency Band*, Report and Order, Memorandum Opinion and Order, and Further Notice of Proposed Rulemaking, 12 FCC Rcd 5754, 5770 (¶ 37) (1997) ("It has been widely known and discussed in the record that DARS providers will need to rely on terrestrial repeaters and gap fillers.").

Unlike the open processes the Commission properly followed with regard to use of the TV white spaces and AWS-3 proceedings, the WCS proposals have not been subject to any independent testing. Likewise, the FCC staff's tentative conclusions – as reflected in the draft order – have not been subjected any public review or comment.

The need for caution and transparency here is particularly important for at least two reasons. First, the wrong technical conclusion will severely impact service provided to more than 19 million satellite radio consumers and the billions of dollars' those consumers have invested in their satellite equipment. Sirius XM's technical analyses submitted in this docket demonstrate that the effect of WCS interference will be to mute its signal – preventing any reception whatsoever – at unpredictable times and locations. If the Commission makes the wrong decision, the impact on Sirius XM's subscribers will be severe and very difficult to reverse. Second, the Commission's engineering staff concluded in 1997 that the changes now sought by WCS to allow mobile operations in the WCS band were “technologically infeasible” and would not protect satellite radio consumers. The laws of physics have not changed since 1997, and there is no magic filter or screen that can be applied to embedded Sirius XM equipment to counteract the impact of increased WCS out-of-band emissions (“OOBE”) into the satellite radio allocation.

Accordingly, Sirius XM strongly urges the FCC to withhold action on any modification of the WCS technical rules, especially the recommendation for relaxing the OOBE specification applicable to mobile WCS devices until: (1) the FCC makes available for public review and comment the technical analysis and tentative conclusions of its technical staff; and (2) independent or joint testing supervised by the FCC's technical staff has been completed.

From what Sirius XM has been able to understand, and contrary to statements Chairman Martin has made publicly, the draft order does not represent a “compromise” of any sort. Rather, it primarily represents the adoption of a proposal set forth by WCS interests. For example, Sirius XM's understanding is that the Chairman's draft order would modify the out-of-band emissions (“OOBE”) specifications applicable to WCS mobile devices to a “stepped” emissions mask with the following requirements:

<u>Required Attenuation</u>	<u>Frequencies</u>
55 + 10 log P	2320-2324/2341-2345 MHz
61 + 10 log P	2324-2328/2337-2341 MHz
67 + 10 log P	2328-2337 MHz

Figure 1 below shows this emissions mask overlaid onto the Sirius XM bandplan.

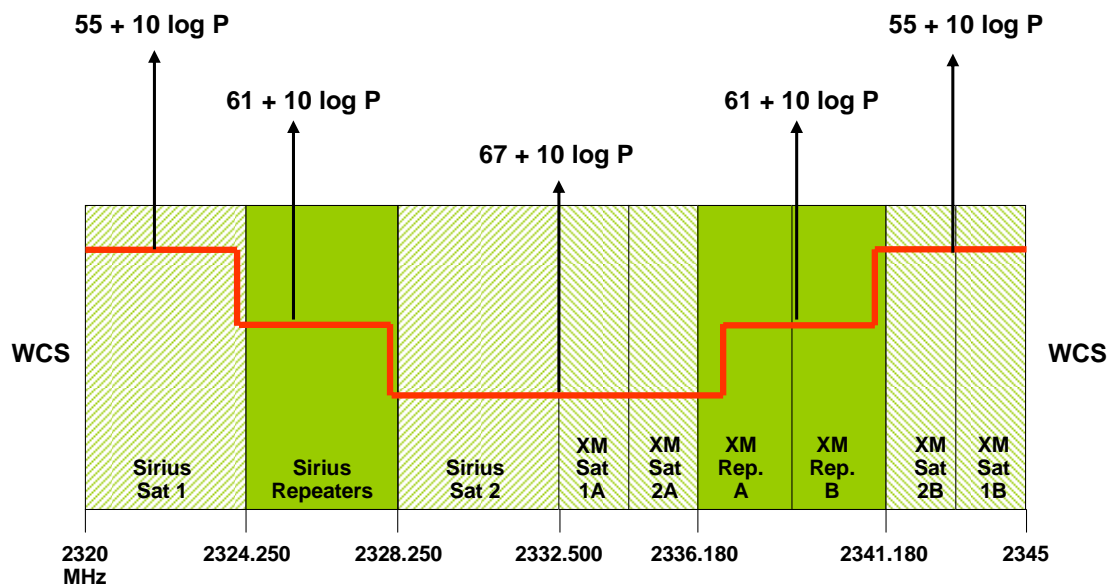


Figure 1: WCS OOB Mask as Defined in the Draft Order

This emissions mask, which is a major component of the draft decision, is precisely the same as the one recommended for adoption by the WCS Coalition in previously filed comments in these proceedings.<sup>3</sup> Over the course of the past year, Sirius XM has submitted comprehensive technical data and analysis demonstrating that lowering WCS OOB to such levels will cause harmful interference to satellite radio reception.<sup>4</sup> Adopting the WCS recommended emissions mask is hardly a compromise.

Particularly disturbing to Sirius XM is the fact that no data in the record supports the position that adopting this emissions mask will not cause harmful interference to satellite radio. To the contrary, the WCS Coalition's submissions confirm that application of this specific OOB mask will mute satellite radio reception even when the interfering WCS

<sup>3</sup> See Comments of the WCS Coalition, WT Docket No. 07-293, IB Docket No. 95-91, at 10 (filed Feb. 14, 2008). Unless otherwise noted, all citations to comments and ex parte letters refer to submissions filed under these same docket numbers.

<sup>4</sup> See Comments of Sirius Satellite Radio Inc., at 20-22 & Exhibits A, C (filed Feb. 14, 2008); Comments of XM Radio Inc., at 29-32 & Exhibits A, C (filed Feb. 14, 2008); Reply Comments of Sirius Satellite Radio Inc., at 11-29 & Technical Appendix, Exhibits B-D (filed Mar. 17, 2008) ("Sirius Reply Comments"); Reply Comments of XM Radio Inc., at 16-25 & Technical Appendix, Exhibits B, C (filed Mar. 17, 2008); Letter from James S. Blitz, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC, at 4-15 & Exhibits A, B (filed Sep. 8, 2008) ("Sirius XM Sep. 8 Ex Parte"); Letter from Robert L. Pettit, Counsel to Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC (filed Nov. 6, 2008); Letter from Terrence R. Smith and James S. Blitz, Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC (filed Nov. 13, 2008) ("Sirius XM Nov. 13 Ex Parte"); Letter from Robert L. Pettit, Counsel to Sirius XM Radio Inc., to Marlene H. Dortch, Secretary, FCC (filed Dec. 2, 2008) ("Sirius XM Dec. 2 Ex Parte").

mobile device and the victim satellite radio receivers are separated by relatively large distances.<sup>5</sup>

The process of establishing OOB limits to restrict interference to protected services often assumes the undesired, interfering signals will further attenuate (or lessen in intensity) before those signals arrive at the potential victim receiver. “Path loss” is the term used to describe the amount that a signal attenuates or degrades when traveling from one point to another. A variety of factors (transmitter power, distance, intervening terrain and objects, antenna mismatches, *etc.*) account for the total path loss between interfering devices and the victim receivers.

In the attached appendix, Sirius XM calculates the amount of path loss necessary for WCS OOB emissions to attenuate below the levels that do not interfere with satellite radio transmissions. This calculation shows that if a WCS device operates in a manner consistent with what Sirius XM understands to be in the draft order (*i.e.*, 250 milliwatts of power and compliance with the OOB mask as proposed by the WCS Coalition), approximately 87 dB of path loss would be needed to ensure that the out-of-band emissions generated by the WCS device does not mute the outermost satellite streams of the Sirius XM spectrum.

On August 1, 2008, the WCS Coalition submitted into the record the results of its own tests measuring the path losses between a mobile WCS device operating within a vehicle and a satellite radio receiver installed with a roof-mounted antenna in another nearby vehicle.<sup>6</sup> The WCS mobile device was operated in a variety of locations within the first vehicle (*e.g.*, front seat, back seat, ear height, lap height) and the location of the roof-mounted satellite radio antenna was varied between the front and rear of the second vehicle.

The WCS Coalition found that the median path loss between the interfering device and the victim receiver varied between 69.7 dB and 83.7 dB depending on the various configurations tested.<sup>7</sup> Thus, the WCS Coalition data shows that, in most cases, the path attenuation will be 3 - 17 dB less than the 87 dB needed to ensure that the outermost satellite streams operated by Sirius XM are not muted by WCS out-of-band emissions. Furthermore, the distances between the two antennas in the WCS Coalition’s tests varied between 4.4 and 7.2 meters, well beyond the 3 meter standard that both sides agreed was reasonable to assess the compatibility of the two services. If measured at 3 meters, the

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<sup>5</sup> See Letter from Mary N. O’Connor, Counsel to the WCS Coalition, to Marlene H. Dortch, Secretary, FCC, *Path Loss Between WCS Transmitters and SDARS Receivers in Typical Vehicle Usage Scenarios* (filed Aug. 1, 2008).

<sup>6</sup> See *id.*

<sup>7</sup> *Id.* at 12-14. It should be noted that the WCS Coalition provided only median data, which may obscure the magnitude of the interference from those samples above the median value.

WCS Coalition's test data would be even further below the 87 dB needed to protect satellite radio reception.<sup>8</sup>

This analysis focuses on WCS interference to Sirius XM's outermost satellite signal, *i.e.*, the Sirius XM sub-channels that are immediately adjacent to both halves of the WCS allocation. Sirius XM has previously explained how loss of these signals – especially the “XM Sat 1B/2B” signals – can have devastating impact to its service delivery.<sup>9</sup> Those signals carry content channels not present on the inner “XM Sat 1A/2A” signals and satellite radio's diversity techniques cannot mitigate this interference. The loss of these signals would be service interruption on the affected channels.

Accordingly, the WCS Coalition's own in-car test data shows that WCS mobile devices operating within vehicles will create OOB levels sufficient to mute satellite radio reception when the two devices are within 3 meters of each other – and even further apart. To the best of Sirius XM's knowledge, this is the only in-car path loss data in the record that covers the scenario in which WCS mobile devices operate within vehicles and it fails to support adopting the WCS OOB mask as contemplated by the draft order. Thus, accepting the draft decision's OOB mask will permit WCS devices to interfere with satellite radio service. This result is unacceptable. It also confirms the validity of the engineering underlying the Commission's 1997 allocation decisions.<sup>10</sup>

Furthermore, this interference situation is not – and cannot effectively be – ameliorated by the Sirius XM terrestrial repeater network. Although terrestrial repeaters can in some circumstances provide sufficiently strong signals to overcome WCS interference, this will unfortunately not be the case in most parts of the country. Thus, any reliance by the Commission on Sirius XM's repeater network to mitigate WCS interference is misplaced, inaccurate and contrary to the record.

Throughout this proceeding, Sirius XM has repeatedly explained that terrestrial repeaters serve less than one percent of the land area of the United States.<sup>11</sup> Sirius XM has also shown that even in those areas with repeaters coverage is not uniform, and satellite receivers are constantly switching between satellite and terrestrial feeds.<sup>12</sup> For example,

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<sup>8</sup> Similarly, the data would be much worse if measured with the WCS transmitting antenna located on the roof of the car or handheld by a pedestrian. In either of these cases, Sirius XM receivers would not benefit from the additional attenuation of the WCS signal caused by operation within an enclosed vehicle.

<sup>9</sup> See Sirius XM Nov. 13 Ex Parte, at 3.

<sup>10</sup> See *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, Report and Order, 12 FCC Rcd 10785, 10787 (¶ 3) (1997); *Amendment of the Commission's Rules to Establish Part 27, the Wireless Communications Service*, Memorandum Opinion and Order, 12 FCC Rcd 3977, 3991 (¶¶ 25, 27) (1997) (stating that the original, more restrictive OOB limitation was “necessary to ensure the viability” of satellite radio).

<sup>11</sup> See, *e.g.*, Sirius XM Sep. 8 Ex Parte, at 7.

<sup>12</sup> See, *e.g.*, Sirius XM Dec. 2 Ex Parte, Presentation, at 22.

in the dense urban canyons of Manhattan – an area in which repeaters could be expected to be critical to the delivery of satellite service – service is still provided by satellite signals over a significant portion of the market area.<sup>13</sup> Sirius XM has also explained that its repeater network was not designed as an interference mitigation strategy and that the repeater signal levels that its repeaters typically provide are often below that needed to overcome WCS interference.<sup>14</sup> If the coverage contour of the existing repeater network was adjusted from the signal level required today for support of Sirius XM’s service to a signal level required to mitigate the predicted level of interference, the cumulative coverage footprint would be reduced by more than 50 percent. A very large number of new repeaters would be needed simply to restore that lost coverage.

Furthermore, population density is not a design criterion for repeater deployment. Repeaters do not expand Sirius XM’s capacity to serve additional customers in congested population areas. Rather, Sirius XM deploys repeaters where known shadowing and blockage of the satellite signals occur – *i.e.*, to “fill-in” the satellite signal as was the companies’ and the Commission’s original intent.

This fact is highlighted by the attached maps showing repeater coverage in portions of the Washington DC area. These maps show the lack of *any* repeater coverage along major commuter routes of I-95, I-70 and I-295 in Maryland. Under the existing rules, Sirius XM did not need to deploy repeaters along these heavily traveled highways because drivers along these roads typically have a clear view of the sky and satellites. Yet these roads are precisely the types of locations where our receivers will be most susceptible to interference from mobile WCS devices. While subscribers have learned to expect outages in certain areas where dense foliage and urban buildings prevent the delivery of satellite signals, they will quickly become dissatisfied with their service if they experience interference during their drive-time commute while underneath an open sky.

The response by the WCS licensees that Sirius XM can simply build more repeaters is disingenuous and cynical given their long-standing opposition to repeater deployment. It is not a reasonable solution to expect Sirius XM to deploy tens of thousands of additional repeaters across the country or even along major roads to address interference into satellite radio spectrum from WCS devices. Such an approach would be prohibitively expensive, wasteful of spectrum, and would transform a satellite service into primarily a terrestrial one. Moreover, since Sirius XM would not know where it needs to locate repeaters until after it receives subscriber complaints, Sirius XM’s customers would be significantly impacted well before any additional repeaters could be constructed to mitigate their interference. Expecting Sirius XM to spend millions, perhaps billions, of dollars to modify its network in order to accommodate yet another change in the business plans of WCS licensees is patently unfair.

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<sup>13</sup> See *id.* A map showing the mix of satellite and terrestrial service in Manhattan is included in the attached appendix.

<sup>14</sup> See, *e.g.*, Sirius Reply Comments at 19-22 & Exhibits A, C (at 4-8).

Sirius XM asks the Commission to take this information into account when deciding the outcome of these proceedings. More importantly, Sirius XM urges the Commission to improve the transparency of this process by releasing the staff's analysis and tentative conclusions prior to adopting any final rules in WT Docket No. 07-293.

Respectfully submitted,

/s/ Terrence R. Smith

Terrence R. Smith  
Corporate Vice President and  
Chief Engineering Officer  
Sirius XM Radio Inc.  
1221 Avenue of the Americas  
New York, NY 10020

/s/ James S. Blitz

James S. Blitz  
Vice President, Regulatory  
Counsel  
Sirius XM Radio, Inc.  
1500 Eckington Place, N.E.  
Washington D.C. 20002

## APPENDIX

### Path Loss Calculations

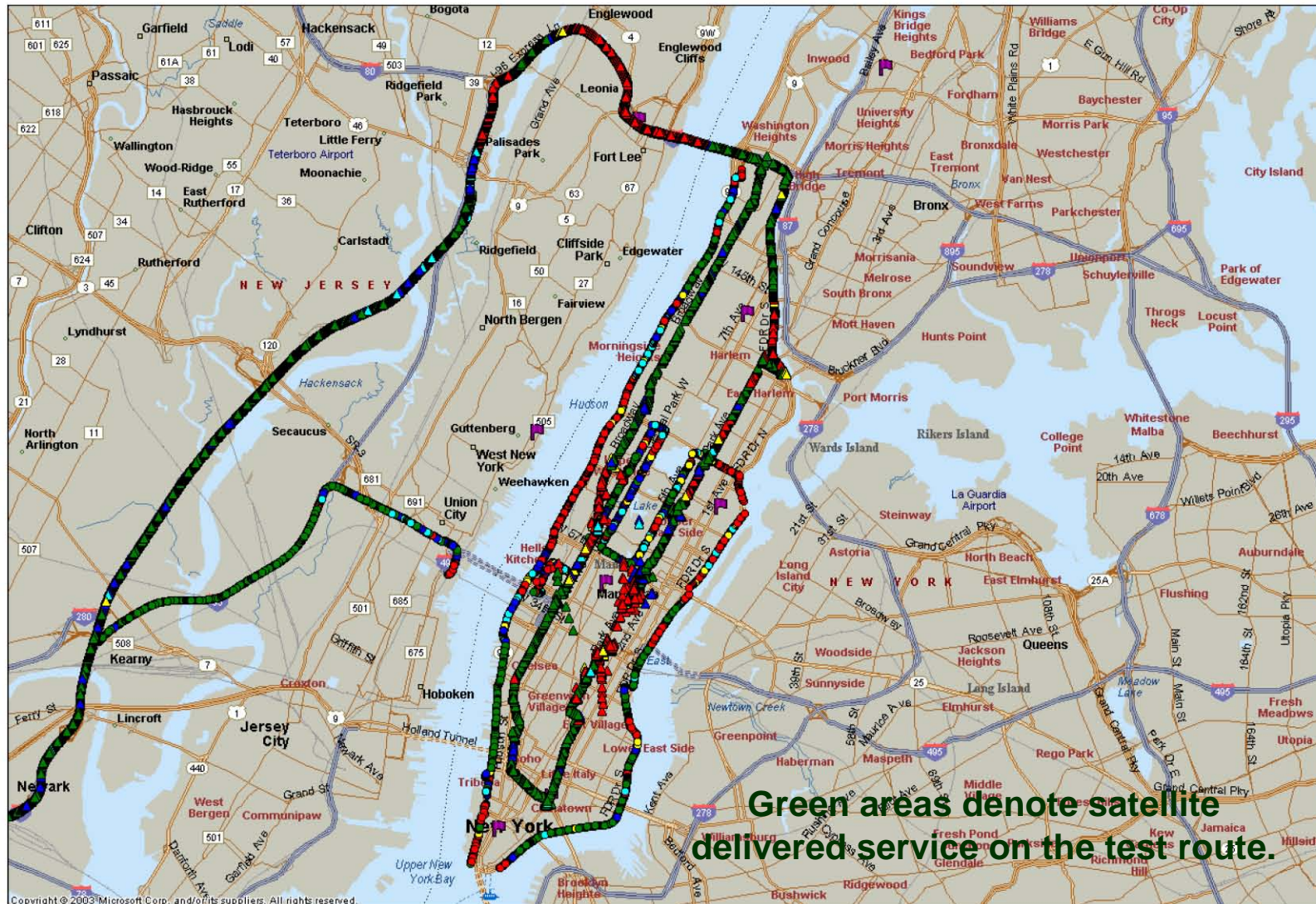
**WCS device operating power:** 0.250 milliwatts EIRP (+23.9 dBm)

**WCS device OOB specification:**  $55 + \log P$  into 2320-2324/2341-2345 MHz

Inserting the WCS operating power into the above equation results in a required 48.9 dB attenuation of WCS out-of-band emissions in the relevant frequency bands. In terms of power, this is -25 dBm as measured in a 1 MHz bandwidth. This equates to a -19 dBm signal in a 4 MHz bandwidth in the satellite radio allocation (*e.g.*, 2320-2324 or 2341-2345 MHz).

The desired satellite signal strength is assumed to be -100 dBm. Sirius XM has previously indicated that an interfering signal of -106 dBm is sufficient to mute the reception of the desired satellite signal, even in the clear line-of-sight.

Above, we showed that the WCS OOB signal at the WCS transmitter is -19 dBm. This relatively strong signal needs to be attenuated to a level below -106 dBm to avoid muting the satellite transmissions in either 2320-2324 MHz or 2341-2345 MHz. This requires 87 dB of path loss from the WCS mobile transmitting device to the satellite radio receiver (-19 dBm minus -106 dBm equals 87 dB).

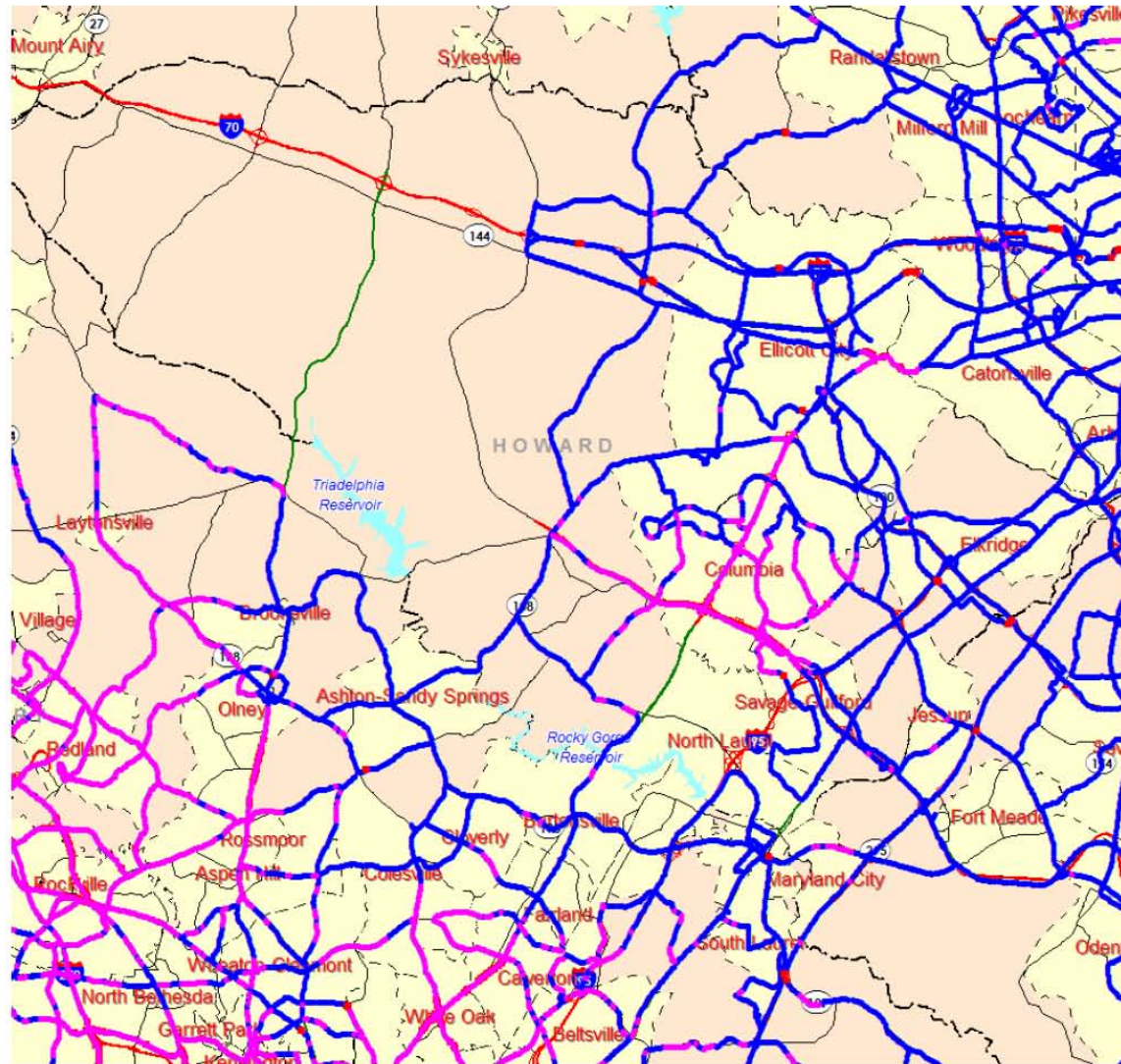


**Even in Manhattan, consumers rely on satellite signals.**

# Washington D.C. Market (Suburban Maryland)

Satellite Coverage

Repeater Coverage



## Cities without any SDARS Repeaters

110 of top 247 Cities (18M people)  
have no SDARS repeaters

